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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003905880 for a patent by THE FIRE COMPANY PTY LTD as filed on 24 October 2003.



WITNESS my hand this
Fifth day of November 2004

A handwritten signature in cursive script, reading 'J. Billingsley'.

JULIE BILLINGSLEY
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AUSTRALIA
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PROVISIONAL SPECIFICATION

Applicant(s):

THE FIRE COMPANY PTY LTD

Invention Title:

A BURNER FOR A HEATER

The invention is described in the following statement:

A BURNER FOR A HEATER

Field of the Invention

The present invention broadly relates to a burner for
5 a heater. The burner is arranged for combustion of a
hydrocarbon liquid.

Background of the Invention

Traditionally, heating of buildings such as private
10 homes involves gas, oil, wood and electric heaters.
Generally, wood heaters have the disadvantage that a flue
is required for exhaust fumes and that the wood needs to
be stored. In many dwellings such as apartments, units
and townhouses installation of a flue and storage of the
15 wood may cause problems or may not be possible at all.
Gas heaters have similar problems as a gas connection is
required. Oil heaters also need to be flued. Electrical
heaters are generally rather expensive to operate and
require electrical connections.

20 One interesting and largely environmentally clean
alternative is a heater that is arranged for combustion of
a hydrocarbon liquid such as an alcohol. For example, if
ethanol is combusted, the exhaust products are largely
limited to carbon dioxide and water steam.

25 A simple burner for ethanol has previously been used
to provide a heat source for a fireplace. This burner
comprises an open tank in which ethanol is combusted.
However, as ethanol and other hydrocarbon liquids are
easily combustible and may even be explosive if in vapour
30 form or mixed with air, there is a need for a burner for a
hydrocarbon liquid that provides improved safety.

Summary of the Invention

The present invention provides in a first aspect a burner for a heater, the burner being suitable for combustion of a hydrocarbon liquid and comprising a combustion chamber for combusting the hydrocarbon liquid, the combustion chamber having a combustion control means which is arranged to control oxygen diffusion into the combustion chamber and thereby to control the combustion.

10 The heater may be a heater for heating at least a portion of a building such as a commercial space or a home.

For example, the control means may comprise an opening that allows diffusion of oxygen into the combustion chamber and a closure for the opening. This particular arrangement has the advantage that operation of the flame of the burner may be extinguished at any time by simply closing the opening and thereby interrupting the supply of oxygen required for the combustion. This feature therefore provides a significant safety advantage.

20 The control means may also be arranged to regulate the oxygen diffusion into the combustion chamber so as to regulate the combustion properties of the burner. This feature therefore allows the regulation of the heat and flame output and of the consumption of the hydrocarbon liquid.

For example, the combustion control means may comprise an opening of the combustion chamber and a shutter that is arranged to adjust the opening and/or close the opening. The combustion chamber may comprise a lid portion in which the opening is positioned and the shutter may be arranged to slide across the opening of the lid portion. The shutter may be positioned inside the

combustion chamber and may be arranged for sliding across an inner surface of the lid portion. In a specific embodiment the shutter and the lid portion are arranged so that shutter may not interfere with objects on the
5 combustion chamber. Further, a mechanism that may be associated with the shutter may be positioned so that it cannot easily be accessed from the outside of the combustion chamber which would further improve the safety of the burner. Further, the shutter may comprise rollers
10 which are guided by guides in the lid and which improve the smoothness of the sliding motion when the shutter is moved. In order to reduce the likelihood of jamming of the shutter, a portion of the shutter that in use is in contact with the lid portion may comprise a material that
15 is softer than the lid portion which it contacts.

The combustion chamber may comprise stainless steel and the softer material may be brass.

In one specific embodiment the shutter is arranged so that, when the opening is closed, the lid portion overlaps
20 the shutter. Because of the overlap, the likelihood of oxygen diffusion into the combustion chamber with an amount sufficient for combustion is further reduced which further improves the safety of the burner. Further, the shutter may comprise a handle portion that in use projects
25 through a slot of the lid portion and the burner may be arranged so that movement of the handle portion along the slot effects sliding of the shutter across the opening of the lid portion. The chamber may be configured such that oxygen diffusion through the slot is substantially
30 inhibited.

The combustion chamber may comprise a fuel inlet opening through which the hydrocarbon liquid may be filled into a tank portion of the combustion chamber. The fuel

inlet opening is typically remote from the opening of the combustion control means.

Further, the fuel inlet opening may comprise a closure, such as a shutter, and the burner may be arranged
5 so that, when the shutter of the combustion control means is fully open, the shutter of the fuel inlet means is closed and only when at least a portion of the shutter of the combustion control means is closed the fuel inlet
10 shutter of the combustion control means and the shutter of the fuel inlet means are provided in form of an integral part.

The fuel inlet opening may also comprise a grid through which the hydrocarbon liquid is filled into a tank
15 portion. The grid functions to reduce the likelihood of formation of air pockets in the hydrocarbon liquid during filling and formation of air bubbles when the fuel is filled into the tank portion.

Further, the tank portion itself may at least in part
20 be filled with a means that reduces the likelihood of formation of air pockets in the hydrocarbon liquid in the tank which could present a safety hazard. In a specific embodiment the tank portion is at least in part filled with steel wool to reduce likelihood of air pocket
25 formation in the tank. Further, the steel wool may function to reduce the temperature of the burner and thereby may regulate or minimise fuel consumption. The steel wool may be stainless steel wool which has superior corrosion properties compared with conventional steel
30 wool.

In a specific example the combustion chamber comprises two tank portions between which a combustion zone is positioned. In this example the combustion zone

is located underneath the opening of the combustion control means. The tank portions are separated from the combustion zone by wall portions that comprise apertures to allow the fuel to penetrate from the tank portions into
5 the combustion zone. In this example, both tank zones are at least in part filled with steel wool.

The burner may be arranged for the combustion of any hydrocarbon liquid including any type of alcohol. In a specific embodiment the burner is arranged for the
10 combustion of ethanol or methylated spirits which has the advantage that the combustion is largely environmentally friendly.

The present invention provides in a second aspect a heater comprising the above-defined burner.
15

The present invention provides in a third aspect a burner for a heater, the burner being suitable for combustion of a hydrocarbon liquid and comprising a combustion chamber for combusting the hydrocarbon liquid,
20 the combustion chamber having a combustion control means which is arranged to control oxygen convection within the combustion chamber and thereby to control the combustion.

The burner defined in the third aspect is typically
25 as defined for the first aspect of the invention.

The present invention provides in a fourth aspect a method of controlling combustion of a hydrocarbon liquid by a burner of a heater, the method comprising the
30 step of controlling oxygen diffusion into the combustion chamber and thereby controlling the combustion.

The step of controlling may comprise closing an

opening of a combustion chamber of the burner to
extinguish the flame of the burner. Alternatively or
additionally, the step of controlling may comprise
regulating the oxygen diffusion into the combustion
5 chamber so as to regulate the combustion properties of the
burner.

The invention will be more fully understood from the
following description of a specific embodiment. The
description is provided with reference to the accompanying
10 drawings.

Brief Description of the Drawings

Figure 1 is (a) a side-view; (b) a further side-view,
(c) a top-view and (d) a perspective view of a burner for
15 a heater according to a specific embodiment,

Figure 2 is a perspective and exploded view of
components of the burner shown in Figure 1.

Detailed Description of a Specific Embodiment

20 Referring to Figures 1 and 2 the burner for a heater
according to a specific embodiment is now described. In
this embodiment the burner 10 comprises a lid portion 12
and a body portion 14. The lid portion 12 and body
portion 14 are composed of stainless steel. The lid
25 portion 12 has an opening 16 below which the combustion
zone of the burner is located. In this embodiment, the
combustion zone is positioned between two tank portions of
the burner and stainless steel walls 18 and 20 separate
the tank portions from the combustion zone. The walls 18
30 and 20 have apertures which allow the hydrocarbon liquid
to penetrate from the tank portions into the combustion
zone. The tank portions are filled with stainless steel
wool (not shown) which functions to reduce likelihood of

formation of air pockets within the hydrocarbon liquid and also has cooling properties which are advantageous for fuel consumption and safety of the burner operation.

5 In this embodiment, the burner 10 is arranged for the combustion of ethanol or methylated spirits which has the advantage that the combustion is largely environmentally friendly.

The burner also comprises a shutter 22 that is guided by guides 24 and 26. The shutter 22 has a handle
10 portion 28 that projects through a slot 30 of the lid portion 12. By moving the handle portion 28 along the slot 30 the shutter adjusts the opening 16 and thereby controls the exchange of oxygen and exhaust through the opening 16 (and also controls the convection of oxygen
15 within the combustion chamber). This allows to control heat output of the burner and the fuel consumption. Further, the shutter may fully close opening 16 so that the penetration of oxygen into the combustion chamber is substantially stopped whereby the flame in the combustion
20 zone is extinguished. The shutter 22 is larger than the opening 16 so that in a closed position the shutter 22 overlaps lid portion 12 from the inside and, due to the overlap, the likelihood of diffusion of an amount of oxygen into the combustion chamber that is sufficient for
25 combustion is further reduced.

Wall portion 18 comprises a flat portion 32 which has a recess portion 34 positioned underneath handle portion 28 and slot 30 so as to prevent diffusion of oxygen through the slot into the interior of the burner 10.

30 Shutter 22 comprises brass rollers (not shown) which are received by guides 24 and 26 so that during sliding of the shutters the rollers roll in guides 24 and 26 which reduces friction. Further, as the rollers are composed of

brass which is a soft material, likelihood of jamming is reduced.

The lid portion 12 comprises a fuel inlet opening 34 which has an internal grid (not shown) through which
5 during a fuel filling process fuel penetrates and which reduces likelihood of formation of air pockets in the fuel. The shutter 22, the opening 34 and the opening 16 are arranged so that, when shutter 22 opens fuel inlet opening 34, the shutter 22 closes at least a portion of
10 opening 16 and thereby reduces the flame in the combustion zone which improves the safety during filling the hydrocarbon liquid into the burner 10. Further, fuel inlet opening 34 has a lid 36 and in this specific embodiment wall 20 has a scale that functions as a fuel
15 level indicator.

In this embodiment the burner is largely composed of stainless steel (the exception being the brass rollers of the shutter 22) which resists corrosion.

The body 14 has a V-shaped bottom portion 38 and
20 therefore gravity permits the direction of the hydrocarbon liquid to the combustion zone. The lid portion 12 has lips 40 and 42 which are arranged to be slidably received by the interior of the body portion 14 and thereby provide a largely oxygen diffusion tight connection with the body
25 portion 14.

The burner 10 may also comprise spacers (not shown) such as brackets that allow the burner to be installed into a combustible medium such as a timber plate. In this case the spacers may be arranged to inhibit direct contact
30 of the combustion chamber and the combustible medium.

Although the invention has been described with reference to particular examples, it will be appreciated by those skilled in the art that the invention may be

embodied in many other forms. For example, the burner may be arranged for the combustion of any hydrocarbon liquid. Further, the burner may not comprise a shutter but any type of closure. The burner may also comprise any number
5 of tank portions and may not comprise stainless steel. Further, the burner may have any volume, size and shape including for example round, rectangular and triangular shapes.

The Claims defining the Invention are as Follows:

1. A burner for a heater, the burner being suitable for
5 combustion of a hydrocarbon liquid and comprising a
combustion chamber for combusting the hydrocarbon liquid,
the combustion chamber having a combustion control means
which is arranged to control oxygen diffusion into the
combustion chamber and thereby is arranged to control the
10 combustion.
2. The burner as claimed in claim 1 wherein the control
means comprises an opening that allows diffusion of oxygen
into the combustion chamber and a further comprises a
15 closure for the opening.
3. The burner as claimed in claim 1 or 2 wherein the
control means is arranged to regulate the diffusion of
oxygen into the combustion chamber so as to regulate the
20 combustion properties of the burner.
4. The burner as claimed in claims 2 or 3 wherein the
control means comprises a shutter that is arranged to
adjust the opening.
25
5. The burner as claimed in claim 4 wherein the
combustion chamber comprises a lid portion in which the
opening is positioned and the shutter is arranged to slide
across the opening of the lid portion.
30
6. The burner as claimed in claim 5 wherein the shutter
is positioned inside the combustion chamber.

7. The burner as claimed in claim 5 or 6 wherein the shutter is arranged for sliding across an inner surface of the lid portion.

5 8. The burner as claimed in any one of claims 4 to 7 wherein the shutter comprises rollers which are guided by guides.

9. The burner as claimed in any one of claims 4 to 8
10 wherein a portion of the shutter that in use is in contact with the lid portion comprises a material that is softer than the lid portion which it contacts.

10. The burner as claimed in claim 9 comprising stainless
15 steel and wherein the softer material is brass.

11. The burner as claimed in any one of the preceding claims wherein the combustion chamber comprises a fuel inlet opening through which the hydrocarbon liquid is
20 filled into a tank portion of the combustion chamber.

12. The burner as claimed in claim 2 or any one of claims 3 to 11 when dependent on claim 2 wherein the fuel inlet opening is spaced from the opening of the combustion
25 control means and therefore, in use, the fuel is during filling remote from the flame.

13. The burner as claimed in claim 11 wherein the fuel inlet opening comprises a closure and the burner is
30 arranged so that, when the shutter of the combustion control means is fully open, the shutter of the fuel inlet means is closed and only when at least a portion of the shutter of the combustion control means is closed the fuel

inlet opening is fully open.

14. The burner as claimed in claim 12 or 13 wherein the
fuel inlet opening comprises a grid through which the
5 hydrocarbon liquid is filled into a tank portion.

15. The burner as claimed in any one of the preceding
claims wherein a tank portion of the combustion chamber is
at least in part filled with a means that reduces the
10 likelihood of formation of air pockets in the hydrocarbon
liquid in the tank.

16. The burner as claimed in claim 15 wherein the tank
portion is at least in part filled with steel wool to
15 reduce likelihood of air pocket formation in the tank.

17. The burner as claimed in claim 16 wherein the steel
wool is stainless steel wool.

20 18. The burner as claimed in any one of the preceding
claims being arranged for the combustion of ethanol or
methyalted spirit.

19. A burner for a heater, the burner being suitable for
25 combustion of a hydrocarbon liquid and comprising a
combustion chamber for combusting the hydrocarbon liquid,
the combustion chamber having a combustion control means
which is arranged to control oxygen convection within the
combustion chamber and thereby to control the combustion.

30

20. The burner as claimed in claim 19 being otherwise as
the burner claimed in any one of claims 1 to 18.

21. A heater comprising the burner as claimed in any one of the preceding claims.

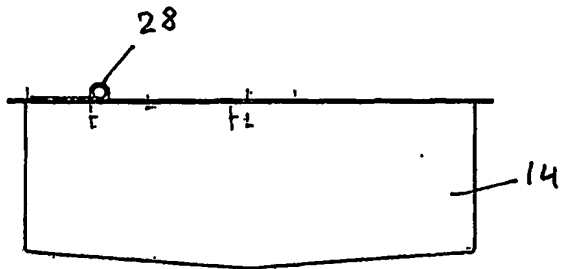
22. A method of controlling combustion of a hydrocarbon liquid by a burner of a heater, the method comprising the step of controlling oxygen diffusion into the combustion chamber and thereby controlling the combustion.

23. The method as claimed in claim 22 wherein the step of controlling comprises closing an opening of a combustion chamber of the burner to extinguish the flame of the burner.

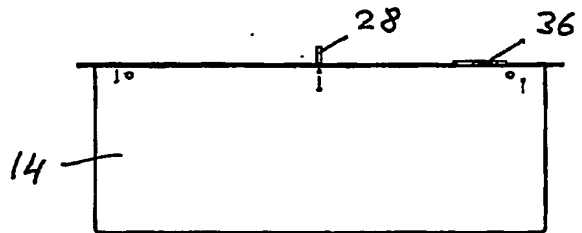
24. The method as claimed in claim 22 or 23 wherein the step of controlling comprises regulating the oxygen diffusion into the combustion chamber so as to regulate the combustion properties of the burner.

DATED this 24th day of OCTOBER 2003

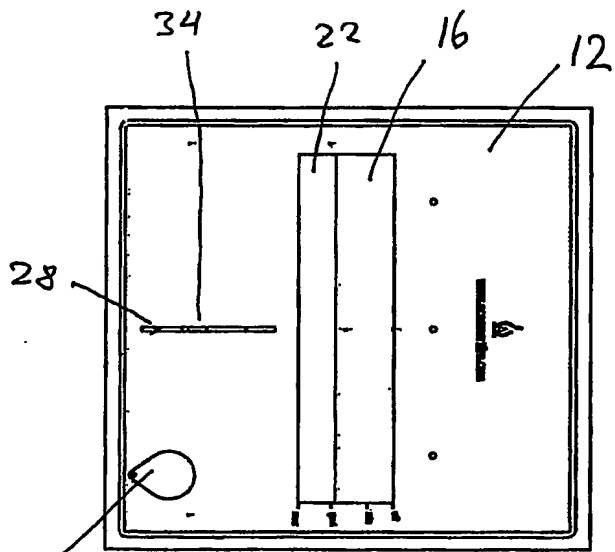
THE FIRE COMPANY PTY LTD
By their Patent Attorneys
GRIFFITH HACK



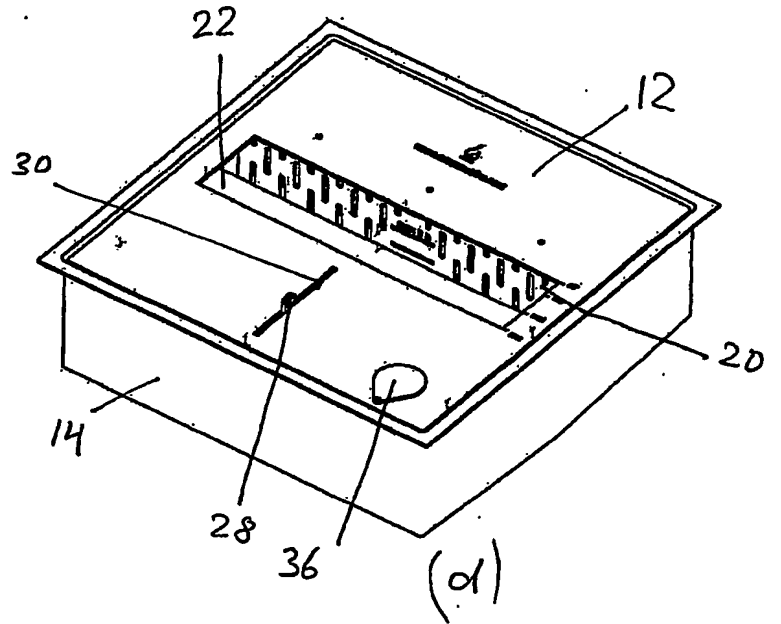
(a)



(b)



(c)



(d)

FIG. 1

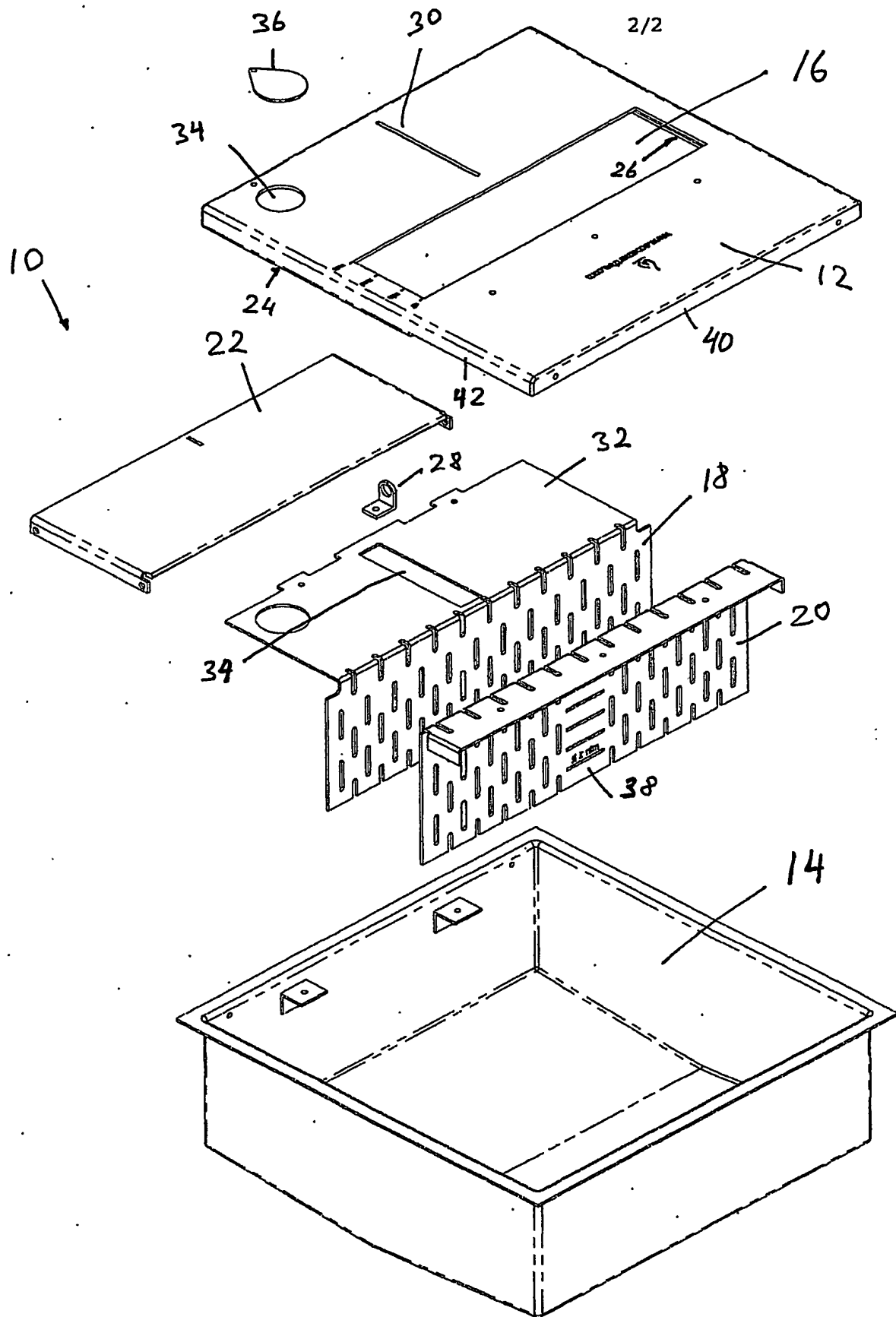


FIG. 2

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